



**Demonstration Report
Selective Catalytic Reduction**

Plant:
Joppa

Revision: 1

Public Record Claimed Exempt In-Part

**LAFARGE - U.S. EPA Consent Decree
Final Demonstration Report**

Plant: Joppa
Affected state: Illinois
Affected kiln: K1
Pollutant: Nitrogen oxides (NO_x)
Control technology: Selective Catalytic Reduction

Table of Contents

1.	Introduction	2
2.	Commencement of the Demonstration Period	2
3.	Impact of SCR operations	3
4.	Description of Operational Problems Encountered.....	3
5.	NO _x Emissions results.....	4
6.	Proposed 30-Day Rolling Average for NO _x	4
	Appendix A: Data Collection	5

Prepared by:	CD Team	Date:	23 April 2015	Page	1	of	17
Checked by:	JF Latimier	Date:	23 April 2015				
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1. Introduction

Pursuant to the terms of the Consent Decree between the Lafarge Companies, the United States and certain Affected States, several of Lafarge's U.S. cement plants are required to implement various control technologies on certain kilns in order to reduce sulfur dioxide (SO_2) and/or nitrogen oxide (NO_x) emissions.

A requirement of the Consent Decree is the submittal of a control technology final demonstration report for some affected kilns for each control technology. This document is the final demonstration report covering the NO_x control technology requirement prescribed for the Joppa kiln #1 (K1), under Section V. A. Paragraph 34 of the Consent Decree. The specified technology for this kiln is selective catalytic reduction (SCR).

The Optimization Report was reviewed and approved by the EPA and the State of Illinois on March 20, 2014, with an optimized injection rate of 10.60 liters per minute of aqueous ammonia, equivalent to 1.39 molar ratio. Following the approval of the Optimization Report, the Demonstration Period commenced and followed the requirements of the demonstration program, as described in Section V of the Appendix to the Consent Decree.

- The Lafarge Companies shall operate a Control Technology for a period of at least 12 Operating Months consistent with the operating parameters determined during the Optimization Period and identified in the Optimization Report approved by the EPA and the Affected State.
- During the Demonstration Period, the Lafarge Companies shall collect the same data as required in Paragraph 8 of the Appendix. At least every 60 Days, the Lafarge Companies shall submit periodic Demonstration Period reports to U.S. EPA and the Affected State during the Demonstration Period. Six such interim reports were submitted during the Demonstration Period.
- Within 60 Days following completion of the Demonstration Period, the Lafarge Companies shall submit a Final Demonstration Report to U.S. EPA and the Affected State, based upon and including all of the data collected during the Demonstration Period including data from Startup, Shut Down and Malfunction events, that identifies proposed 30-Day Rolling Average Emission Limits for NO_x at the Affected Kiln subject to the requirements of the Appendix.
- The Lafarge Companies shall propose 30-Day Rolling Average Emission Limits in the Final Demonstration Report in accordance with the definition of that term in the Consent Decree. The Final 30-Day Rolling Average Emission Limit for an Affected Kiln shall be calculated in accordance with following formula:

$$X = U + 1.645\sigma$$

Where:

X = 30-Day Rolling Average Emission Limit (lb/ton clinker)

U = mean of all of the 30-Day averages

σ = standard deviation of all of the 30-Day averages

2. Commencement of the Demonstration Period

The Optimization Report was approved on March 20, 2014 and the Demonstration Period commenced on March 22, 2014. In accordance with the approved optimization report, the Joppa plant has since maintained continuous operation of the SCR technology and reagent injection at the rate of 10.60 lpm, equivalent to a molar ratio of 1.39 mol of $[\text{NH}_4\text{OH}]$ per mol NO_x (uncontrolled).

Prepared by:	CD Team	Date:	23 April 2015	Page	2	of	17
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3. Impact of SCR operations

The primary factors that have been used to assess the impact of SCR on Joppa K1 are:

- **Health and safety** – Plant personnel received site specific training on receiving, handling, storage, and spill response for aqueous ammonia. Local emergency response personnel have been trained on handling aqueous ammonia spills. An eye wash station, emergency shower, and spill kit are located inside the ammonia pump house. An ammonia leak sensor is installed inside the ammonia pump house. The Material Safety Data Sheet (MSDS) for aqueous ammonia is located on the 3E^[1] web site. Safety interlocks and alarms are programmed and have been tested. Labels have been installed on equipment, piping and instrumentation.
- **Environmental compliance**
Routine emissions (as measured by Continuous Emissions Monitoring Systems and calculated in the Data Acquisition System) are discussed in Section 5.
- **Products' quality**
No quality concerns or issues were observed during the Demonstration Period. The plant maintained consistent quality.
- **Kiln productivity**
There was no observable impact on kiln productivity during the Demonstration Period as compared to the Baseline Data.
- **Kiln reliability** (i.e. maintaining good uptime) – There were several kiln outages during the Demonstration Period; however, none of them is attributable to the reagent injection.

4. Description of Operational Problems Encountered

During the demonstration period, the SCR control technology performed well and no operational problem was encountered. However, on two occasions following the failure of one field of the Electro-Static Precipitator ahead of the SCR, the top of the catalyst layers had to be manually cleaned to remove the dust accumulation. Adjustments to the soot blower cleaning frequency, air flowrates and air temperatures were made to alleviate the issue. As a whole, the soot blowers did an effective job in keeping the top of the catalyst layers free of blockages.

No other significant operational problems occurred during the Demonstration Period related to the SCR system.

¹ 3E Online is a third party vendor which provides online access to a customer's hazardous material inventory and associated Material Safety Data Sheets MSDS: <http://www.3eonline.com>

Prepared by:	CD Team	Date:	23 April 2015	Page	3	of	17
Checked by:	JF Latimier	Date:	23 April 2015				
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5. NO_x Emissions results

The demonstration period commenced on March 22, 2014 and concluded on February 28, 2015, providing 12 operating months of data.

During this period, the kiln was shut down six times for an extended period of time:

- from April 01, 2014 to April 02, 2014: for maintenance activities
- from June 15, 2014 to June 17, 2014: for maintenance activities
- from August 23, 2014 to August 28, 2014: for maintenance activities
- from October 06, 2014 to October 07, 2014: for maintenance activities
- from January 02, 2015 to January 20, 2015: for maintenance activities
- on February 17, 2015: for maintenance activities

Excluding the periods above, the data collected during the demonstration period contains typical kiln variations as well as periods of Startup, Shutdown and Malfunction. The results can be summarized as follows:

Mean of all the 30-Day averages:	1.99 lb/ton clinker
Standard deviation of all the 30-Day averages:	0.75

The 12-Month rolling average emission was 1.96 lb/ton clinker, which corresponds to a reduction of NO_x emissions of 79.8% compared to Baseline Data. This is consistent with the design requirements outlined in Section II 4 (d) of the Consent Decree Appendix.

Detailed data can be found in Appendix A.

6. Proposed 30-Day Rolling Average for NO_x

Based on the results obtained during the Demonstration Period indicated in paragraph 5 and in accordance with the formula in paragraph 21 of the Appendix, Lafarge proposes that the Final 30-Day Rolling Average Limit for NO_x on Kiln 1 at the Joppa facility be 3.21 lb/ton clinker.

Prepared by:	CD Team	Date:	23 April 2015	Page	4	of	17
Checked by:	JF Latimier	Date:	23 April 2015				
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Appendix A: Data Collection

Prepared by:	CD Team	Date:	23 April 2015	Page	5	of	17
Checked by:	JF Latimier	Date:	23 April 2015				
File name:	JPA-K1-SCR-Final Demonstration Report-rev1 - CBI masked.docx			Document number:	JPA-K1-SCR-FD-013		



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Baseline Data Collection

Kiln 1 SCR Final Demonstration Report

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Joppa
Grand Chain, Illinois
K1

Data collection start date: 22 March 2014
Data collection end date: 28 February 2015
Submittal date: 23 April 2015

Columns a through i: Public Record Claimed Exempt

Operating days	Date	a	b	c	d					e	f	g	h	i
		Stack temperature [°F]	Kiln (clinker) production [ton/d]	Raw meal (kiln feed) rate [ton/d]	Limestone [% mass, wet]	Alumina [% mass, wet]	Iron [% mass, wet]	Sand [% mass, wet]	In-house recycle [% mass, wet]	Total raw material feed rate (to RM) [ton/d, wet]	Stack NO _x [ppmvd]	Stack SO ₂ [ppmvd]	Flue gas flow rate [acfmin, dry]	Kiln feed burnability [---]
1	2014.03.22													
2	2014.03.23													
3	2014.03.24													
4	2014.03.25													
5	2014.03.26													
6	2014.03.27													
7	2014.03.28													
8	2014.03.29													
9	2014.03.30													
10	2014.03.31													
	2014.04.01													
	2014.04.02													
11	2014.04.03													
12	2014.04.04													
13	2014.04.05													
14	2014.04.06													
15	2014.04.07													
16	2014.04.08													
17	2014.04.09													
18	2014.04.10													
19	2014.04.11													
20	2014.04.12													
21	2014.04.13													
22	2014.04.14													
23	2014.04.15													
24	2014.04.16													
25	2014.04.17													
26	2014.04.18													
27	2014.04.19													
28	2014.04.20													
29	2014.04.21													
30	2014.04.22													
31	2014.04.23													
32	2014.04.24													
33	2014.04.25													
34	2014.04.26													
35	2014.04.27													
36	2014.04.28													
37	2014.04.29													
38	2014.04.30													
39	2014.05.01													
40	2014.05.02													
41	2014.05.03													
42	2014.05.04													
43	2014.05.05													
44	2014.05.06													
45	2014.05.07													
46	2014.05.08													
47	2014.05.09													
48	2014.05.10													
49	2014.05.11													
50	2014.05.12													
51	2014.05.13													
52	2014.05.14													
53	2014.05.15													
54	2014.05.16													
55	2014.05.17													
56	2014.05.18													

Prepared by:	CD Team	Date:	23 April 2015	Page	6	of	17
Checked by:	JF Latimier	Date:	23 April 2015				
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57	2014.05.19													
58	2014.05.20													
59	2014.05.21													
60	2014.05.22													
61	2014.05.23													
62	2014.05.24													
63	2014.05.25													
64	2014.05.26													
65	2014.05.27													
66	2014.05.28													
67	2014.05.29													
68	2014.05.30													
69	2014.05.31													
70	2014.06.01													
71	2014.06.02													
72	2014.06.03													
73	2014.06.04													
74	2014.06.05													
75	2014.06.06													
76	2014.06.07													
77	2014.06.08													
78	2014.06.09													
79	2014.06.10													
80	2014.06.11													
81	2014.06.12													
82	2014.06.13													
83	2014.06.14													
	2014.06.15													
	2014.06.16													
	2014.06.17													
84	2014.06.18													
85	2014.06.19													
86	2014.06.20													
87	2014.06.21													
88	2014.06.22													
89	2014.06.23													
90	2014.06.24													
91	2014.06.25													
92	2014.06.26													
93	2014.06.27													
94	2014.06.28													
95	2014.06.29													
96	2014.06.30													
97	2014.07.01													
98	2014.07.02													
99	2014.07.03													
100	2014.07.04													
101	2014.07.05													
102	2014.07.06													
103	2014.07.07													
104	2014.07.08													
105	2014.07.09													
106	2014.07.10													
107	2014.07.11													
108	2014.07.12													
109	2014.07.13													
110	2014.07.14													
111	2014.07.15													

Prepared by:	CD Team	Date:	23 April 2015	Page	7	of	17
Checked by:	JF Latimier	Date:	23 April 2015				
File name:	JPA-K1-SCR-Final Demonstration Report-rev1 - CBI masked.docx	Document number:	JPA-K1-SCR-FD-013				



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112	2014.07.16													
113	2014.07.17													
114	2014.07.18													
115	2014.07.19													
116	2014.07.20													
117	2014.07.21													
118	2014.07.22													
119	2014.07.23													
120	2014.07.24													
121	2014.07.25													
122	2014.07.26													
123	2014.07.27													
124	2014.07.28													
125	2014.07.29													
126	2014.07.30													
127	2014.07.31													
128	2014.08.01													
129	2014.08.02													
130	2014.08.03													
131	2014.08.04													
132	2014.08.05													
133	2014.08.06													
134	2014.08.07													
135	2014.08.08													
136	2014.08.09													
137	2014.08.10													
138	2014.08.11													
139	2014.08.12													
140	2014.08.13													
141	2014.08.14													
142	2014.08.15													
143	2014.08.16													
144	2014.08.17													
145	2014.08.18													
146	2014.08.19													
147	2014.08.20													
148	2014.08.21													
149	2014.08.22													
150	2014.08.23													
151	2014.08.24													
152	2014.08.25													
153	2014.08.26													
154	2014.08.27													
155	2014.08.28													
156	2014.08.29													
157	2014.08.30													
158	2014.08.31													
159	2014.09.01													
160	2014.09.02													
161	2014.09.03													
162	2014.09.04													
163	2014.09.05													
164	2014.09.06													
165	2014.09.07													
166	2014.09.08													
167	2014.09.09													
168	2014.09.10													
169	2014.09.11													

Prepared by:	CD Team	Date:	23 April 2015	Page	8	of	17
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164	2014.08.12													
165	2014.08.13													
166	2014.09.14													
167	2014.09.15													
168	2014.09.16													
169	2014.09.17													
170	2014.09.18													
171	2014.09.19													
172	2014.09.20													
173	2014.09.21													
174	2014.09.22													
175	2014.09.23													
176	2014.09.24													
177	2014.09.25													
178	2014.09.26													
179	2014.09.27													
180	2014.09.28													
181	2014.09.29													
182	2014.09.30													
183	2014.10.01													
184	2014.10.02													
185	2014.10.03													
186	2014.10.04													
187	2014.10.05													
	2014.10.06													
	2014.10.07													
188	2014.10.08													
189	2014.10.09													
190	2014.10.10													
191	2014.10.11													
192	2014.10.12													
193	2014.10.13													
194	2014.10.14													
195	2014.10.15													
196	2014.10.16													
197	2014.10.17													
198	2014.10.18													
199	2014.10.19													
200	2014.10.20													
201	2014.10.21													
202	2014.10.22													
203	2014.10.23													
204	2014.10.24													
205	2014.10.25													
206	2014.10.26													
207	2014.10.27													
208	2014.10.28													
209	2014.10.29													
210	2014.10.30													
211	2014.10.31													
212	2014.11.01													
213	2014.11.02													
214	2014.11.03													
215	2014.11.04													
216	2014.11.05													
217	2014.11.06													
218	2014.11.07													
219	2014.11.08													

Prepared by:	CD Team	Date:	23 April 2015	Page	9	of	17
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220	2014.11.09													
221	2014.11.10													
222	2014.11.11													
223	2014.11.12													
224	2014.11.13													
225	2014.11.14													
226	2014.11.15													
227	2014.11.16													
228	2014.11.17													
229	2014.11.18													
230	2014.11.19													
231	2014.11.20													
232	2014.11.21													
233	2014.11.22													
234	2014.11.23													
235	2014.11.24													
236	2014.11.25													
237	2014.11.26													
238	2014.11.27													
239	2014.11.28													
240	2014.11.29													
241	2014.11.30													
242	2014.12.01													
243	2014.12.02													
244	2014.12.03													
245	2014.12.04													
246	2014.12.05													
247	2014.12.06													
248	2014.12.07													
249	2014.12.08													
250	2014.12.09													
251	2014.12.10													
252	2014.12.11													
253	2014.12.12													
254	2014.12.13													
255	2014.12.14													
256	2014.12.15													
257	2014.12.16													
258	2014.12.17													
259	2014.12.18													
260	2014.12.19													
261	2014.12.20													
262	2014.12.21													
263	2014.12.22													
264	2014.12.23													
265	2014.12.24													
266	2014.12.25													
267	2014.12.26													
268	2014.12.27													
269	2014.12.28													
270	2014.12.29													
271	2014.12.30													
272	2014.12.31													
273	2015.01.01													
	2015.01.02													
	2015.01.03													
	2015.01.04													
	2015.01.05													

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	2015.01.06														
	2015.01.07														
	2015.01.08														
	2015.01.09														
	2015.01.10														
	2015.01.11														
	2015.01.12														
	2015.01.13														
	2015.01.14														
	2015.01.15														
	2015.01.16														
	2015.01.17														
	2015.01.18														
	2015.01.19														
	2015.01.20														
274	2015.01.21														
275	2015.01.22														
276	2015.01.23														
277	2015.01.24														
278	2015.01.25														
279	2015.01.26														
280	2015.01.27														
281	2015.01.28														
282	2015.01.29														
283	2015.01.30														
284	2015.01.31														
285	2015.02.01														
286	2015.02.02														
287	2015.02.03														
288	2015.02.04														
289	2015.02.05														
290	2015.02.06														
291	2015.02.07														
292	2015.02.08														
293	2015.02.09														
294	2015.02.10														
295	2015.02.11														
296	2015.02.12														
297	2015.02.13														
298	2015.02.14														
299	2015.02.15														
300	2015.02.16														
301	2015.02.17														
302	2015.02.18														
303	2015.02.19														
304	2015.02.20														
305	2015.02.21														
306	2015.02.22														
307	2015.02.23														
308	2015.02.24														
309	2015.02.25														
310	2015.02.26														
311	2015.02.27														
	2015.02.28														

Prepared by:	CD Team	Date:	23 April 2015	Page	11	of	17
Checked by:	JF Latimier	Date:	23 April 2015				
File name:	JPA-K1-SCR-Final Demonstration Report-rev1 - CBI masked.docx	Document number:	JPA-K1-SCR-FD-013				



Demonstration Report Selective Catalytic Reduction

Plant:
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Revision: 1

U.S. EPA Consent Decree
Baseline Data Collection

Kiln 1 SCR Final Demonstration Report

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Joppa
Grand Chain, Illinois
K1

Columns j through m: Public Record Claimed Exempt

Appendix § III paragraph 8:		i		Kiln		m		NO _x control reagent		n		o	
Operating days	Date	Coal [tonne/h] [as-fired]	Fuel rates Coke [tonne/h] [as-fired]	Gas [Nm ³ /h] [as-fired]	Fuel distribution Kiln burning zone	Combustion air flow rates Primary air [Nm ³ /h]	Secondary air [Nm ³ /h]	Type [-]	Rate [ppm]	Start-up, shut-down, malfunction documentation Incident type	Explanation	Missing data	Data gap documentation Explanation
1	2014.03.22							Aq. ammonia	10.62				
2	2014.03.23							Aq. ammonia	10.61				
3	2014.03.24							Aq. ammonia	10.62				
4	2014.03.25							Aq. ammonia	10.62				
5	2014.03.26							Aq. ammonia	10.59				
6	2014.03.27							Aq. ammonia	10.59				
7	2014.03.28							Aq. ammonia	10.59				
8	2014.03.29							Aq. ammonia	10.59				
9	2014.03.30							Aq. ammonia	10.59				
10	2014.03.31							Aq. ammonia	4.36	Shut-down	Clinker cooler repairs [100h 3m]	All data	Kiln was down
	2014.04.01											All data	Kiln was down
	2014.04.02												
11	2014.04.03							Aq. ammonia	0.05	Start-up	Preheating		
12	2014.04.04							Aq. ammonia	1.39	Malfunction	Plugged feed pipe [11m]		
13	2014.04.05							Aq. ammonia	10.62				
14	2014.04.06							Aq. ammonia	10.10				
15	2014.04.07							Aq. ammonia	10.61				
16	2014.04.08							Aq. ammonia	10.61				
17	2014.04.09							Aq. ammonia	10.60	Malfunction	Repair to kiln support system [6m]		
18	2014.04.10							Aq. ammonia	10.60				
19	2014.04.11							Aq. ammonia	10.60				
20	2014.04.12							Aq. ammonia	10.59				
21	2014.04.13							Aq. ammonia	10.59				
22	2014.04.14							Aq. ammonia	10.59				
23	2014.04.15							Aq. ammonia	10.58				
24	2014.04.16							Aq. ammonia	10.59				
25	2014.04.17							Aq. ammonia	10.59				
26	2014.04.18							Aq. ammonia	10.59				
27	2014.04.19							Aq. ammonia	10.59				
28	2014.04.20							Aq. ammonia	10.59				
29	2014.04.21							Aq. ammonia	10.59				
30	2014.04.22							Aq. ammonia	10.59				
31	2014.04.23							Aq. ammonia	10.59				
32	2014.04.24							Aq. ammonia	10.59				
33	2014.04.25							Aq. ammonia	10.59				
34	2014.04.26							Aq. ammonia	10.59				
35	2014.04.27							Aq. ammonia	10.59				
36	2014.04.28							Aq. ammonia	10.59				
37	2014.04.29							Aq. ammonia	10.59				
38	2014.04.30							Aq. ammonia	10.59				
39	2014.05.01							Aq. ammonia	10.60				
40	2014.05.02							Aq. ammonia	10.60				
41	2014.05.03							Aq. ammonia	10.60				
42	2014.05.04							Aq. ammonia	10.60				
43	2014.05.05							Aq. ammonia	10.61				
44	2014.05.06							Aq. ammonia	10.61				
45	2014.05.07							Aq. ammonia	10.61				
46	2014.05.08							Aq. ammonia	10.61				
47	2014.05.09							Aq. ammonia	10.61				
48	2014.05.10							Aq. ammonia	10.61				
49	2014.05.11							Aq. ammonia	10.61				
50	2014.05.12							Aq. ammonia	10.61				
51	2014.05.13							Aq. ammonia	10.61				
52	2014.05.14							Aq. ammonia	10.62				
53	2014.05.15							Aq. ammonia	10.62				
54	2014.05.16							Aq. ammonia	10.62				
55	2014.05.17							Aq. ammonia	10.62				
56	2014.05.18							Aq. ammonia	10.62				

Prepared by:	CD Team	Date:	23 April 2015	Page	12	of	17
Checked by:	JF Latimier	Date:	23 April 2015				
File name:	JPA-K1-SCR-Final Demonstration Report-rev1 - CBI masked.docx		Document number:	JPA-K1-SCR-FD-013			



Demonstration Report Selective Catalytic Reduction

Plant:
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U.S. EPA Consent Decree
Baseline Data Collection

Kiln 1 SCR Final Demonstration Report

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Grand Chain, Illinois
K1

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Appendix § III paragraph 8:		i			Kiln		m		NO _x control reagent		n		o	
Operating days	Date	Coal [tonne/h] [as-fired]	Fuel rates Coke [tonne/h] [as-fired]	Gas [Nm ³ /h] [as-fired]	Fuel distribution Kiln burning zone [% heat]	Combustion air flow rates Primary air [Nm ³ /h]	Secondary air [Nm ³ /h]	Type [--]	Rate [ppm]	Incident type	Start-up, shut-down, malfunction documentation	Explanation	Missing data	Data gap documentation
57	2014.05.19							Aq. ammonia	9.80	Shut-down	ESP maintenance [29h 39m]			
58	2014.05.20							Aq. ammonia	0.00	Start-up	Preheating			
59	2014.05.21							Aq. ammonia	10.20					
60	2014.05.22							Aq. ammonia	10.64					
61	2014.05.23							Aq. ammonia	10.65					
62	2014.05.24							Aq. ammonia	10.66					
63	2014.05.25							Aq. ammonia	10.68					
64	2014.05.26							Aq. ammonia	10.69					
65	2014.05.27							Aq. ammonia	10.62					
66	2014.05.28							Aq. ammonia	10.63					
67	2014.05.29							Aq. ammonia	10.63					
68	2014.05.30							Aq. ammonia	10.62					
69	2014.05.31							Aq. ammonia	10.62					
70	2014.06.01							Aq. ammonia	10.61					
71	2014.06.02							Aq. ammonia	10.61					
72	2014.06.03							Aq. ammonia	10.61					
73	2014.06.04							Aq. ammonia	10.60					
74	2014.06.05							Aq. ammonia	10.60					
75	2014.06.06							Aq. ammonia	10.59					
76	2014.06.07							Aq. ammonia	10.59					
77	2014.06.08							Aq. ammonia	10.58					
78	2014.06.09							Aq. ammonia	10.60					
79	2014.06.10							Aq. ammonia	10.12	Malfunction	Kiln drive instrumentation failure [1h 24m]			
80	2014.06.11							Aq. ammonia	10.61					
81	2014.06.12							Aq. ammonia	10.61					
82	2014.06.13							Aq. ammonia	10.60					
83	2014.06.14							Aq. ammonia	10.59					
84	2014.06.15							Aq. ammonia	3.97	Shut-down	Refractory failure [116h]			
85	2014.06.16							Aq. ammonia			All data		Kiln down	
86	2014.06.17							Aq. ammonia			All data		Kiln down	
87	2014.06.18							Aq. ammonia	0.00	Start-up	Preheating			
88	2014.06.19							Aq. ammonia	8.58					
89	2014.06.20							Aq. ammonia	10.62					
90	2014.06.21							Aq. ammonia	10.04					
91	2014.06.22							Aq. ammonia	10.58					
92	2014.06.23							Aq. ammonia	10.55					
93	2014.06.24							Aq. ammonia	9.94	Malfunction	Plant power failure [18m]			
94	2014.06.25							Aq. ammonia	10.61					
95	2014.06.26							Aq. ammonia	10.63					
96	2014.06.27							Aq. ammonia	10.64					
97	2014.06.28							Aq. ammonia	9.70	Malfunction	Clinker cooler overload [45m]			
98	2014.06.29							Aq. ammonia	10.40					
99	2014.06.30							Aq. ammonia	10.63					
100	2014.07.01							Aq. ammonia	10.63					
101	2014.07.02							Aq. ammonia	8.11					
102	2014.07.03							Aq. ammonia	10.59					
103	2014.07.04							Aq. ammonia	10.63					
104	2014.07.05							Aq. ammonia	10.67					
105	2014.07.06							Aq. ammonia	10.39					
106	2014.07.07							Aq. ammonia	10.61					
107	2014.07.08							Aq. ammonia	10.61					
108	2014.07.09							Aq. ammonia	10.61					
109	2014.07.10							Aq. ammonia	10.61					
110	2014.07.11							Aq. ammonia	10.61					
111	2014.07.12							Aq. ammonia	10.61					
112	2014.07.13							Aq. ammonia	10.61					
113	2014.07.14							Aq. ammonia	10.61					
114	2014.07.15							Aq. ammonia	10.61					

Prepared by:	CD Team	Date:	23 April 2015	Page	13	of	17
Checked by:	JF Latimier	Date:	23 April 2015				
File name:	JPA-K1-SCR-Final Demonstration Report-rev1 - CBI masked.docx			Document number:	JPA-K1-SCR-FD-013		



Demonstration Report Selective Catalytic Reduction

Plant:
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U.S. EPA Consent Decree
Baseline Data Collection

Kiln 1 SCR Final Demonstration Report

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Grand Chain, Illinois
K1

Columns j through m: Public Record Claimed Exempt

Operating days	Date	i		Kiln		m		Combustion air flow rates		NO _x control reagent		n		o	
		Coal [tonne/h] [as-fired]	Fuel rates Coke [tonne/h] [as-fired]	Gas [Nm ³ /h] [as-fired]	Fuel distribution Kiln burning zone [% heat]	Primary air [Nm ³ /h]	Secondary air [Nm ³ /h]	Type [-]	Rate [ppm]	Start-up, shut-down, malfunction documentation	Incident type	Explanation	Missing data	Data gap documentation	
112	2014.07.16							Aq. ammonia	10.61						
113	2014.07.17							Aq. ammonia	10.61						
114	2014.07.18							Aq. ammonia	10.61						
115	2014.07.19							Aq. ammonia	10.61						
116	2014.07.20							Aq. ammonia	10.60						
117	2014.07.21							Aq. ammonia	10.60						
118	2014.07.22							Aq. ammonia	10.60						
119	2014.07.23							Aq. ammonia	10.60						
120	2014.07.24							Aq. ammonia	10.60						
121	2014.07.25							Aq. ammonia	10.60						
122	2014.07.26							Aq. ammonia	10.60						
123	2014.07.27							Aq. ammonia	10.60						
124	2014.07.28							Aq. ammonia	10.60						
125	2014.07.29							Aq. ammonia	10.60						
126	2014.07.30							Aq. ammonia	10.60						
127	2014.07.31							Aq. ammonia	10.60						
128	2014.08.01							Aq. ammonia	10.60						
129	2014.08.02							Aq. ammonia	10.60						
130	2014.08.03							Aq. ammonia	10.60						
131	2014.08.04							Aq. ammonia	10.60						
132	2014.08.05							Aq. ammonia	10.60						
133	2014.08.06							Aq. ammonia	10.60						
134	2014.08.07							Aq. ammonia	10.60						
135	2014.08.08							Aq. ammonia	10.60						
136	2014.08.09							Aq. ammonia	10.60						
137	2014.08.10							Aq. ammonia	10.61						
138	2014.08.11							Aq. ammonia	10.60						
139	2014.08.12							Aq. ammonia	10.60						
140	2014.08.13							Aq. ammonia	10.59						
141	2014.08.14							Aq. ammonia	10.53						
142	2014.08.15							Aq. ammonia	10.27						
143	2014.08.16							Aq. ammonia	10.61						
144	2014.08.17							Aq. ammonia	10.60						
145	2014.08.18							Aq. ammonia	10.60						
146	2014.08.19							Aq. ammonia	10.60						
147	2014.08.20							Aq. ammonia	10.59						
148	2014.08.21							Aq. ammonia	10.59						
149	2014.08.22							Aq. ammonia	4.48	Shut-down	Fall outage work [206h 19m]				
	2014.08.23											All data	Kiln was down		
	2014.08.24											All data	Kiln was down		
	2014.08.25											All data	Kiln was down		
	2014.08.26											All data	Kiln was down		
	2014.08.27											All data	Kiln was down		
	2014.08.28											All data	Kiln was down		
150	2014.08.29							Aq. ammonia	0.00	Start-up	Preheating				
151	2014.08.30							Aq. ammonia	0.00						
152	2014.08.31							Aq. ammonia	8.79						
153	2014.09.01							Aq. ammonia	10.62						
154	2014.09.02							Aq. ammonia	10.62						
155	2014.09.03							Aq. ammonia	10.62						
156	2014.09.04							Aq. ammonia	10.62						
157	2014.09.05							Aq. ammonia	10.62						
158	2014.09.06							Aq. ammonia	10.62						
159	2014.09.07							Aq. ammonia	10.62						
160	2014.09.08							Aq. ammonia	10.61						
161	2014.09.09							Aq. ammonia	10.61						
162	2014.09.10							Aq. ammonia	10.61						
163	2014.09.11							Aq. ammonia	10.61						

Prepared by:	CD Team	Date:	23 April 2015	Page	14	of	17
Checked by:	JF Latimier	Date:	23 April 2015				
File name:	JPA-K1-SCR-Final Demonstration Report-rev1 - CBI masked.docx			Document number:	JPA-K1-SCR-FD-013		



Demonstration Report Selective Catalytic Reduction

Plant:
Joppa

Revision: 1

U.S. EPA Consent Decree
Baseline Data Collection

Kiln 1 SCR Final Demonstration Report

**Public Record Claimed
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Joppa
Grand Chain, Illinois
K1

Columns j through m: Public Record Claimed Exempt

Appendix § III paragraph 8:		i		Kiln		m		NO _x control reagent		n		o	
Operating days	Date	Coal [tonne/h] [as-fired]	Coke [tonne/h] [as-fired]	Fuel distribution Kiln burning zone [% heat]	Gas [Nm ³ /h] [as-fired]	Combustion air flow rates Primary air [Nm ³ /h]	Secondary air [Nm ³ /h]	Type [-]	Rate [ppm]	Start-up, shut-down, malfunction documentation Incident type	Explanation	Missing data	Data gap documentation Explanation
164	2014.09.12							Aq. ammonia	10.61				
165	2014.09.13							Aq. ammonia	10.61				
166	2014.09.14							Aq. ammonia	10.61				
167	2014.09.15							Aq. ammonia	10.61				
168	2014.09.16							Aq. ammonia	10.61				
169	2014.09.17							Aq. ammonia	10.61				
170	2014.09.18							Aq. ammonia	10.60				
171	2014.09.19							Aq. ammonia	10.60				
172	2014.09.20							Aq. ammonia	10.60				
173	2014.09.21							Aq. ammonia	10.60				
174	2014.09.22							Aq. ammonia	10.60				
175	2014.09.23							Aq. ammonia	10.60				
176	2014.09.24							Aq. ammonia	10.60				
177	2014.09.25							Aq. ammonia	10.60				
178	2014.09.26							Aq. ammonia	10.60				
179	2014.09.27							Aq. ammonia	10.59				
180	2014.09.28							Aq. ammonia	10.59				
181	2014.09.29							Aq. ammonia	10.59				
182	2014.09.30							Aq. ammonia	10.59				
183	2014.10.01							Aq. ammonia	10.59				
184	2014.10.02							Aq. ammonia	10.59				
185	2014.10.03							Aq. ammonia	10.59				
186	2014.10.04							Aq. ammonia	10.59				
187	2014.10.05							Aq. ammonia	7.36	Shut-down	Kiln down for clinker cooler damages [68h 7 m]	All data	Kiln was down
	2014.10.06											All data	Kiln was down
	2014.10.07												
188	2014.10.08							Aq. ammonia	0.02	Start-up	Preheating		
189	2014.10.09							Aq. ammonia	8.48				
190	2014.10.10							Aq. ammonia	10.62				
191	2014.10.11							Aq. ammonia	10.64				
192	2014.10.12							Aq. ammonia	10.63				
193	2014.10.13							Aq. ammonia	10.62				
194	2014.10.14							Aq. ammonia	10.61				
195	2014.10.15							Aq. ammonia	10.60				
196	2014.10.16							Aq. ammonia	10.59				
197	2014.10.17							Aq. ammonia	7.55				
198	2014.10.18							Aq. ammonia	10.57				
199	2014.10.19							Aq. ammonia	10.59				
200	2014.10.20							Aq. ammonia	10.60				
201	2014.10.21							Aq. ammonia	10.56				
202	2014.10.22							Aq. ammonia	10.57				
203	2014.10.23							Aq. ammonia	10.57				
204	2014.10.24							Aq. ammonia	10.57				
205	2014.10.25							Aq. ammonia	10.57				
206	2014.10.26							Aq. ammonia	10.58				
207	2014.10.27							Aq. ammonia	10.58				
208	2014.10.28							Aq. ammonia	9.87	Malfunction	Kiln Stopped for process reasons [49m]		
209	2014.10.29							Aq. ammonia	10.58				
210	2014.10.30							Aq. ammonia	10.59				
211	2014.10.31							Aq. ammonia	10.59				
212	2014.11.01							Aq. ammonia	10.59				
213	2014.11.02							Aq. ammonia	10.60				
214	2014.11.03							Aq. ammonia	10.60				
215	2014.11.04							Aq. ammonia	10.61				
216	2014.11.05							Aq. ammonia	10.59				
217	2014.11.06							Aq. ammonia	10.58				
218	2014.11.07							Aq. ammonia	10.58				
219	2014.11.08							Aq. ammonia	10.58				

Prepared by:	CD Team	Date:	23 April 2015	Page	15	of	17
Checked by:	JF Latimier	Date:	23 April 2015				
File name:	JPA-K1-SCR-Final Demonstration Report-rev1 - CBI masked.docx		Document number:	JPA-K1-SCR-FD-013			



Demonstration Report Selective Catalytic Reduction

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Joppa
Grand Chain, Illinois
K1

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Operating days	Date	Coal [tonne/h] [as-fired]	Fuel rates Coke [tonne/h] [as-fired]	Gas [Nm ³ /h] [as-fired]	Fuel distribution Kiln burning zone % heat	Combustion air flow rates Primary air [Nm ³ /h]	Secondary air [Nm ³ /h]	Type [-]	Rate [ppm]	Start-up, shut-down, malfunction documentation	Incident type	Explanation	Missing data	Data gap documentation
220	2014.11.09							Aq. ammonia	10.58					
221	2014.11.10							Aq. ammonia	10.58					
222	2014.11.11							Aq. ammonia	10.58					
223	2014.11.12							Aq. ammonia	10.58					
224	2014.11.13							Aq. ammonia	10.58					
225	2014.11.14							Aq. ammonia	10.58					
226	2014.11.15							Aq. ammonia	10.58					
227	2014.11.16							Aq. ammonia	10.58					
228	2014.11.17							Aq. ammonia	10.58					
229	2014.11.18							Aq. ammonia	10.58					
230	2014.11.19							Aq. ammonia	10.58					
231	2014.11.20							Aq. ammonia	4.27	Malfunction	Problem with clinker cooler drive [8h 43m]			
232	2014.11.21							Aq. ammonia	10.62					
233	2014.11.22							Aq. ammonia	10.61					
234	2014.11.23							Aq. ammonia	10.60					
235	2014.11.24							Aq. ammonia	10.59					
236	2014.11.25							Aq. ammonia	10.58					
237	2014.11.26							Aq. ammonia	10.57					
238	2014.11.27							Aq. ammonia	10.56					
239	2014.11.28							Aq. ammonia	10.55					
240	2014.11.29							Aq. ammonia	3.98					
241	2014.11.30							Aq. ammonia	0.02	Shut-down	High pressure drop through the SCR [38h 14m]			
242	2014.12.01							Aq. ammonia	0.00					
243	2014.12.02							Aq. ammonia	10.52					
244	2014.12.03							Aq. ammonia	10.64					
245	2014.12.04							Aq. ammonia	10.64					
246	2014.12.05							Aq. ammonia	10.63					
247	2014.12.06							Aq. ammonia	10.62					
248	2014.12.07							Aq. ammonia	10.61					
249	2014.12.08							Aq. ammonia	10.57					
250	2014.12.09							Aq. ammonia	10.56					
251	2014.12.10							Aq. ammonia	10.63					
252	2014.12.11							Aq. ammonia	10.65					
253	2014.12.12							Aq. ammonia	10.65					
254	2014.12.13							Aq. ammonia	10.64					
255	2014.12.14							Aq. ammonia	10.64					
256	2014.12.15							Aq. ammonia	10.64					
257	2014.12.16							Aq. ammonia	10.64					
258	2014.12.17							Aq. ammonia	10.63					
259	2014.12.18							Aq. ammonia	10.63					
260	2014.12.19							Aq. ammonia	10.63					
261	2014.12.20							Aq. ammonia	10.62					
262	2014.12.21							Aq. ammonia	10.62					
263	2014.12.22							Aq. ammonia	10.62					
264	2014.12.23							Aq. ammonia	10.62					
265	2014.12.24							Aq. ammonia	10.61					
266	2014.12.25							Aq. ammonia	10.61					
267	2014.12.26							Aq. ammonia	10.61					
268	2014.12.27							Aq. ammonia	10.60					
269	2014.12.28							Aq. ammonia	10.60					
270	2014.12.29							Aq. ammonia	10.60					
271	2014.12.30							Aq. ammonia	10.60				All data	
272	2014.12.31							Aq. ammonia	10.59				All data	
273	2015.01.01							Aq. ammonia	7.85	Shut-down	Kiln down for winter outage [517h 50m]		All data	
2015.01.02														
2015.01.03														
2015.01.04														
2015.01.05														

Prepared by:	CD Team	Date:	23 April 2015	Page	16	of	17
Checked by:	JF Latimier	Date:	23 April 2015				
File name:	JPA-K1-SCR-Final Demonstration Report-rev1 - CBI masked.docx			Document number:	JPA-K1-SCR-FD-013		



Demonstration Report Selective Catalytic Reduction

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Kiln 1 SCR Final Demonstration Report

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Grand Chain, Illinois
K1

Columns j through m: Public Record Claimed Exempt

Appendix S III paragraph 8:		i			Kiln		m			NO _x control reagent		n		o	
Operating days	Date	Coal [tonne/h] [as-fired]	Fuel rates Coke [tonne/h] [as-fired]	Gas [Nm ³ /h] [as-fired]	Fuel distribution Kiln burning zone % heat	Combustion air flow rates Primary air [Nm ³ /h]	Secondary air [Nm ³ /h]	Type -->	Rate [ppm]	Start-up, shut-down, malfunction documentation Incident type	Explanation	Missing data	Data gap documentation Explanation		
	2015.01.06									Kiln Down	All data				
	2015.01.07									Kiln Down	All data				
	2015.01.08									Kiln Down	All data				
	2015.01.09									Kiln Down	All data				
	2015.01.10									Kiln Down	All data				
	2015.01.11									Kiln Down	All data				
	2015.01.12									Kiln Down	All data				
	2015.01.13									Kiln Down	All data				
	2015.01.14									Kiln Down	All data				
	2015.01.15									Kiln Down	All data				
	2015.01.16									Kiln Down	All data				
	2015.01.17									Kiln Down	All data				
	2015.01.18									Kiln Down	All data				
	2015.01.19									Kiln Down	All data				
	2015.01.20									Kiln Down	All data				
274	2015.01.21							Aq. ammonia	0.00	Start-up	Kiln preheating				
275	2015.01.22							Aq. ammonia	0.00		Kiln preheating				
276	2015.01.23							Aq. ammonia	5.87	Malfunction	Kiln stopped to inspect clinker cooler [1h 13m]				
277	2015.01.24							Aq. ammonia	10.37	Malfunction	Clinker bucket elevator seized [1h 6m]				
278	2015.01.25							Aq. ammonia	10.56						
279	2015.01.26							Aq. ammonia	10.65						
280	2015.01.27							Aq. ammonia	10.61						
281	2015.01.28							Aq. ammonia	10.62						
282	2015.01.29							Aq. ammonia	10.66						
283	2015.01.30							Aq. ammonia	10.20						
284	2015.01.31							Aq. ammonia	10.57						
285	2015.02.01							Aq. ammonia	10.55						
286	2015.02.02							Aq. ammonia	8.85						
287	2015.02.03							Aq. ammonia	10.25						
288	2015.02.04							Aq. ammonia	10.56						
289	2015.02.05							Aq. ammonia	10.57						
290	2015.02.06							Aq. ammonia	10.59						
291	2015.02.07							Aq. ammonia	10.57						
292	2015.02.08							Aq. ammonia	10.54						
293	2015.02.09							Aq. ammonia	10.55						
294	2015.02.10							Aq. ammonia	10.57						
295	2015.02.11							Aq. ammonia	10.62						
296	2015.02.12							Aq. ammonia	10.64						
297	2015.02.13							Aq. ammonia	10.66						
298	2015.02.14							Aq. ammonia	10.68						
299	2015.02.15							Aq. ammonia	10.67						
300	2015.02.16							Aq. ammonia	4.20	Shut-down	Kiln drive and motor issues [84h 33m]				
301	2015.02.17							Aq. ammonia	0.02	Start-up	Preheating				
302	2015.02.18							Aq. ammonia	0.01						
303	2015.02.19							Aq. ammonia	2.60						
304	2015.02.20							Aq. ammonia	10.60						
305	2015.02.21							Aq. ammonia	7.69						
306	2015.02.22							Aq. ammonia	5.71						
307	2015.02.23							Aq. ammonia	10.61						
308	2015.02.24							Aq. ammonia	10.60						
309	2015.02.25							Aq. ammonia	10.60						
310	2015.02.26							Aq. ammonia	10.66						
311	2015.02.27														

END OF REPORT

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